

TAXONOMY OF ARACHNIS, ARMODORUM,  
ESMERALDA AND DIMORPHORCHIS, ORCHIDACEAE<sup>1</sup>  
PART I

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INTRODUCTION

Not only is the Orchidaceae one of the largest families of Angiosperms, but it also has the least elucidated taxonomy of families of flowering plants of comparable size. This is in part due to the paucity of workers in this family. However, the Orchids have long been a problematic group in which relationships between taxa are extremely complex and often obscured by parallelism and rapid evolution of floral morphology. The family has a sub-cosmopolitan distribution, being equally characteristic of both tropical and temperate regions (Good, 1964) but the actual number of species is immensely greater in the tropics. It is with these tropical species that the taxonomical problems are compounded. Confusion arises particularly at the generic level. Many genera were described from collections made by the early botanical expeditions in the tropics. Numbers of these preserved specimens were scanty, and they often lacked important diagnostic features. Subsequent collections included species that bridged many of these early generic concepts. Later workers, attempting to clarify the delimitations of these genera, grouped species which shared some "key" character. Even the more painstaking workers followed this tendency. In the writing of keys for groups of species, many characters or features are considered, sifted and sorted. When one particular feature emerges from the numerous other characters in what the author considers is a natural grouping, then he tends to over-emphasize the importance of that one feature. Thereafter, any species displaying that feature is included in that particular group. Very often, however, these characters are found to intergrade or are of little significance in indicating true relationships, being the outcome of parallel evolution or convergence. Instead of re-evaluating the original defining character, the tendency has been either to shuffle these problem groups back and forth between taxa or to set up new categories. A case in point is the genus *Arachnis* in the subtribe Sarcanthinae.

The genus *Arachnis* Blume is based on the Linnaean species *Epidendrum flos-aeris*. Since its conception by Blume in 1825, species included in the genus *Arachnis* have also been variously placed in the following genera: *Aerides*, *Arachnanthe*, *Armodorum*, *Arrhynchium*, *Dimorphorchis*, *Esmeralda*, *Renanthera*, *Stauroopsis*, *Trichoglottis*, *Vanda* and *Vandopsis*.

The major contributions to the taxonomy of *Arachnis* have been through the efforts of Schlechter (1911), Smith (1912) and Holttum (1947). Schlechter and Smith, however, had differing opinions regarding the circumscription of the genus. By virtue of his well-known book, "Die Orchideen," Schlechter is usually regarded as the authority on the subject. Holttum, who was the latest botanist to work extensively with the group, concurred with the decisions of Smith.

The inadequacies of literary communication have contributed to the

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confusion in the taxonomy of the genus *Arachnis*. Authors without ready access to each other's works have described the same closely related species under new or different generic names. Species have also been assigned to the genus *Arachnis* which would necessitate the modification of its generic concept. Since these descriptions appear in scattered papers available only to people who have a large botanical library at their command, the generic concepts of the authors tend to be less than homogeneous. It is, therefore, necessary to research the literature for these original descriptions in order to present the best circumscription of the genus *Arachnis*.

Detailed morphological descriptions in *Arachnis* tend to focus on the flower. Keys separating species have relied solely on floral morphology for distinguishing features. This is because the adoption of a monopodial habit by these Sarcanthine orchids has necessitated greater vegetative uniformity than occurs in other groups of orchids (Holtum, 1957). The ability to rest in a leafless condition is lost, and the terminal bud is protected only by a succession of ordinary leaves in various stages of development rather than by specialized protective structures such as scale-leaves or sheaths. The possibility of storing water in a pseudobulb is also lost. These orchids are, therefore, restricted to regions with no very severe dry season.

Despite the relative uniformity of their vegetative parts, different species of *Arachnis* possess very distinctive features in their growth form and vegetative morphology. These features tend to be obscured in pressed and dried material. Often, vegetative portions of the specimens are inadequately represented in herbarium material. This results in much disparity in the degree of completeness of descriptions of vegetative and floral morphology for the various species. Therefore, a standardized treatment of comparative descriptions of vegetative and floral morphology of all species of *Arachnis* is presented. Where available, descriptions are based on fresh material.

*Arachnis* and related genera in the Sarcanthinae reach their greatest development in the Malayan region where conditions imposed by the limitations of the monopodial habit are met. However, descriptions of localities for the different species of *Arachnis*, with a few exceptions, have usually been vague if available at all. From field work in areas of occurrence of *Arachnis* species and their allies, habitat descriptions are made, and these are presented together with distribution ranges of species of *Arachnis*, *Armodorum*, *Dimorphorchis* and *Esmeralda*.

Field studies were conducted in the insular portion of the South East Asian tropics, including the islands of Bali, Borneo, Java and Sumatra. At each of these islands, visits were made to all known localities of *Arachnis* species that were accessible. Flowering plants were located for observation of pollination and for recording of data on habitat and ecology. A collection of living material was made for shipment to Miami for further analysis. This included specimens of three species of *Arachnis* endemic to Malaya and one *Arachnis* species endemic to Borneo.

Herbarium material preserved in alcohol was studied at the Singapore Botanic Garden Herbarium and at the Herbarium Bogoriense in Java. Loans of dried material were also secured from these two herbaria as well as from the Sarawak Forest Department Herbarium (SARF), the U.S. National Museum (US), the Reichenbach Herbarium of the Naturhistorisches Museum (W), the Rijksherbarium (L), the Royal Botanic Gardens Herbar-

ium, Kew (K), and the Museum of Natural History, Laboratory of Phanerogams, Paris (P). Preserved material of the Orchid Herbarium of Oakes Ames (AMES) was also examined.

Live specimens were grown at the greenhouse of the University of Miami, Coral Gables, Florida. Supplementary fresh material was also obtained from orchid nurseries and private collections in the area.

In the study of preserved material, pressed flowers were removed with care from the herbarium sheets. They were then boiled for varying amounts of time prior to dissection in order to soften the tissues. Upon completion of study, the material was carefully dried and returned to the herbarium sheet in packets.

Line drawings of flowers were made from fresh and preserved specimens.

#### CHRONOLOGICAL SURVEY OF TAXONOMIC LITERATURE ON *Arachnis*

The first description of the type species of *Arachnis* was by Kaempfer (1712). It was accompanied by an illustration in his "Amoenitates Exoticae." He named it *Angurek katong'ging* from the Malay words "anggrek," a general name for epiphytic orchids, and "katong'ging" meaning "scorpion," in reference to the fancied resemblance of the flower to the arthropod. Linnaeus (1753) renamed the species *Epidendrum flos-aeris*. In an attempt to provide a more rational treatment of all the species included in the genus *Epidendrum* by Linnaeus, Olof Swartz (1799) renamed the Linnaean species *Aerides arachnites*.

The first person to recognize, describe and name the generic concept *Arachnis* was Blume (1825). The spider-like form of the flowers and the musky odor that emanated from them caused Blume to name the type species *Arachnis moschifera*. *Aerides arachnites* Swartz was placed in synonymy. According to modern nomenclatural rules, however, the correct name of the type species is *Arachnis flos-aeris*, based on *Epidendrum flos-aeris* L. In the same work in which he described *Arachnis*, Blume named a new species, *Aerides sulingi*, which he later placed in the genus *Vanda*, only to have it moved to his own genus, *Arachnis*, by other authors. At the time of Blume's work, almost every species that he saw was new, and he had to make generic delimitations for the many new species. The work was consequently hastily done, and descriptions tended to be brief.

Lindley (1830-40) lumped many of Blume's genera together in his influential work "The Genera and Species of Orchids." He reduced *Arachnis* to synonymy in Loureiro's (1790) genus *Renanthera*, renaming Blume's type species *Renanthera arachnites*. He also transferred *Aerides sulingi* Blume to *Renanthera*. In the preface to his book, Lindley wrote:

... It is, however, a subject of great regret to the author that the Orchidaceae of Java, Sumatra, and the Philippines, countries so peculiarly rich in those plants, should at present be comparatively unknown to him.

This lack of knowledge caused Lindley to make mistakes in treating some of Blume's genera. His handling of *Arachnis* is an example. Unfortunately, his influence was such that later authors perpetuated his misconceptions.

In 1848, Blume reiterated his statement of *Arachnis* as a generic concept distinct from the genus *Renanthera*. However, he changed the name

from *Arachnis* to *Arachnanthe* because the former name was already in use in the Animal Kingdom, and he renamed the type species *Arachnanthe moschifera*. Under the present code of plant nomenclature, botanical and zoological names are independent of each other. Hence, Blume's original generic name is the correct one.

Lindley established a new genus, *Arrhynchium*, in 1850, with *Arrhynchium labrosum* as the type species. This genus was to be placed in synonymy with *Renanthera* in 1855, and with *Arachnis* in 1886, both times by Reichenbach. In his work "Folia Orchidacea" (1852-1855), Lindley listed his *Vanda lowii* in the section *Fieldia* of the genus *Vanda*, and *Vanda cathcartii* in the section *Lamellaria*. Later authors included *Vanda lowii* Ldl. in the genus *Arachnis*, or placed it in its own genus, *Dimorphorchis* (Rolfe 1919). *Vanda cathcartii* was also later given a new generic name, *Esmeralda*, by Reichenbach (1874), and placed in the genus *Arachnis* by Smith (1912). In the same work, Lindley placed *Vanda sulingi* (Bl.) Bl. in the section *Euvanda*, listing Blume's *Aerides sulingi*, *Armodorum distichum* V. Breda, and his own *Renanthera sulingi* in synonymy. At the same time, he noted:

I am uncertain whether a plant, very rare in Gardens, bearing this name (*Vanda sulingi*), and much resembling a *Renanthera*, is what Blume intends; but I presume not.

Reichenbach entered the picture in 1855 when he surveyed the genus *Renanthera* Loureiro. He divided the genus into three sections:

*Eurenanthera*:

This section included the type species *Renanthera coccinea* Lour. as well as Lindley's *Renanthera sulingi*.

*Arrhynchium*:

Reichenbach based this section on the Lindley genus *Arrhynchium*. The two species in this section were *Renanthera labrosa* Rchb.f. and *R. bilinguis* Rchb.f. In placing *R. labrosa* in this section, Reichenbach noted that he was relying solely on Lindley's description of *Arrhynchium labrosum*. The description of *Renanthera bilinguis* Rchb.f. included the quote from Lindley regarding the *Vanda sulingi* in the Gardens. Reichenbach wrote that he had seen the plant referred to in cultivation, and had described it as *R. bilinguis*.

*Arachnanthe*:

Reichenbach based this section on Blume's *Arachnanthe* (*Arachnis*). Listed in this section were three species, *Renanthera flos-aeris*, *R. lowii*, and a new species *R. rohaniana*. Reichenbach thus allied *Arachnis flos-aeris* with Lindley's *Vanda lowii* in the same genus *Renanthera*.

In 1874, Reichenbach established a new genus, *Esmeralda*, based on Lindley's *Vanda cathcartii*. He distinguished *Esmeralda* from *Vanda* by the lip being articulate with the column in *Vanda*, and mobile in *Esmeralda*. He also described a new species in *Renanthera*, *R. hookeriana* Rchb.f., from a specimen from Borneo in Sir William Hooker's herbarium.

Bentham (1881), writing on the Orchideae, listed *Arachnanthe* in his subtribe Sarcantheae. He recognized six species in the genus, placing in synonymy the genera *Esmeralda* Rchb.f., *Arrhynchium* Ldl., and *Armodorum* V. Breda. Subsequently, these views were incorporated into the classic work "Genera Plantarum" by Bentham and Hooker (1883).

The first person to publish correctly the type species of *Arachnis* was Reichenbach. Apparently changing his mind about the generic concept of *Arachnis*, he reinstated it from the genus *Renanthera* where he had included it. In 1886, he combined the original generic name by Blume with the specific epithet of the Linnaean species *Epidendrum flos-aeris*. He also described a new species of *Arachnis* from Papua in the same article, naming it *A. beccarii* after its collector. The following new combinations were made:

*Arachnis hookeriana* (Rchb.f.) Rchb.f.

*Arachnis labrosa* (Ldl.) Rchb.f.

*Arachnis sulingi* (Bl.) Rchb.f.

*Arachnis rohaniana* (Rchb.f.) Rchb.f.

*Arachnis lowii* (Ldl.) Rchb.f.

In the same year, Reichenbach described a new species in his genus *Esmeralda* despite Bentham's earlier attempt to reduce it to synonymy in *Arachnanthe*. He named it *Esmeralda clarkei* after its discoverer, and wrote:

As to the generic name I stick to that given by myself. I never took any steps to make it popular. Those amateurs who are of the usual conservative view may call it *Vanda clarkei* — I only protest against making me author of it.

He named yet another species of *Esmeralda* in 1888. This was *E. bella*, which was based on herbarium sheet number 1022 from the collection of Reichenbach's friend, Mr. W. Bull. Following Bentham and Hooker's classification of the genus, Rolfe renamed *Esmeralda clarkei* as *Arachnanthe clarkei* in the same year.

Pfitzer (1889), in his treatment of the orchid family in Engler and Prantl's "Die Natürlichen Pflanzenfamilien," followed Reichenbach in placing the genus *Arachnis* (*Arachnanthe*) in synonymy to *Renanthera* Lour. He also recognized *Esmeralda* as a distinct genus, and, like Reichenbach, he divided *Renanthera* into different sections. Pfitzer's sections were:

*Eurenanthera* Rchb.f.

*Arrhynchium* Ldl.

*Arachnanthe* Bl.

*Erianthe* Pfitzer

The last section represented a difference from Reichenbach's version. Pfitzer listed *R. lowii* Rchb.f. in a section of its own, whereas Reichenbach had included the species in his section *Arachnanthe*.

*Esmeralda clarkei* Rchb.f. was again listed in synonymy to *Arachnanthe clarkei* by Hooker in the Botanical Magazine (1889). He allied it to *Arachnanthe cathcartii* Benth., thereby following Bentham's treatment of the genus. In addition, Hooker proposed the inclusion of a new species in *Arachnanthe*. This new species, described later in Hooker's "Flora of British India" (1893), was discovered in Malacca (Malaya), and named *Arachnanthe maingayi* after its discoverer.

Writing about the flora of the eastern coast of the Malay Peninsula, Ridley (1893) described a new species which he named *Arachnanthe alba*. He changed his mind in a later paper (1896), and placed this species in the genus *Renanthera*, together with *Arachnanthe maingayi* Hook. and *A.*

*moschifera* Blume. For Blume's species, he substituted one erroneous name for another, using the Lindley name *Renanthera arachnites*. At about this time, Kränzlin (1894) described several new species of New Guinea orchids from herbarium specimens provided by F. von Mueller. One of these species, *Vanda muelleri* Krzl., was to be variously included in the genera *Arachnis* and *Vandopsis* by later authors.

At the close of the 1800's, the taxonomy of the genus *Arachnis* was in a state of confusion. The stage was set for three botanists who were to work extensively with the genus. They were J. J. Smith, R. Schlechter, and R. E. Holttum. Unfortunately, Schlechter and Smith had opposing ideas regarding the treatment of *Arachnis* and related genera. Their publications, while focusing on the problems with the genus, did not exactly alleviate the confusion of its taxonomic status.

Smith's "Die Orchideen von Java" was published in 1905. In this work, Smith used Blume's illegitimate name *Arachnanthe*, and listed two new combinations:

*Arachnanthe flos-aeris* (Bl.) J. J. Sm.

*Arachnanthe sulingi* (Bl.) J. J. Sm.

As new information and new species continued accumulating after the publication of his flora, Smith recorded these in a series of supplements to his flora. One of these new species had been described by Rolfe (1905) in the Gardener's Chronicle, and named *Arachnanthe annamensis*. An illustration of it appeared in the Botanical Magazine (1906), accompanied by Rolfe's Latin description. Smith (1909) himself described one of these new species from an herbarium specimen from Borneo, naming it *Arachnanthe breviscapa*.

Schlechter published an article on the orchids of the Celebes in 1911. In the article he described a new species, *Vandopsis celebica*, which he closely allied with *Arachnanthe breviscapa* J. J. Sm. He included some comparative comments regarding the genera *Vandopsis* and *Arachnis*, but these comments were brief and vague, and did not provide adequate support for the following combinations which he made:

*Vandopsis lowii* (Ldl.) Schltr.

*Vandopsis muelleri* (Krzl.) Schltr.

*Vandopsis breviscapa* (J. J. Sm.) Schltr.

Schlechter correctly pointed out that Blume's first name *Arachnis*, should be used instead of *Arachnanthe* in accordance with nomenclatural rules, and consequently made the following recombinations:

*Arachnis flos-aeris* (L.) Schltr.

*Arachnis hookeriana* (Rchb.f.) Schltr.

*Arachnis alba* (Ridl.) Schltr.

*Arachnis maingayi* (Hk.f.) Schltr.

It would appear from these recombinations however, that Schlechter had either ignored or was unaware of Reichenbach's earlier paper (1886) in which he reinstated the genus *Arachnis*. Schlechter also restored the Reichenbach genus *Esmeralda* with its two species, *E. cathcartii* Rchb.f. and *E. clarkei* Rchb.f., and brought back into use Van Breda's genus *Armadorum*, making two new recombinations:

*Armadorum sulingi* (Bl.) Schltr.

*Armodorum labrosum* (Lindl. et Paxt.) Schltr.

The following year, he added a new species to the genus, naming it *Armodorum siamense*.

J. J. Smith (1912), in response to Schlechter's article, came out with a paper presenting his own version of the genera *Arachnis* and *Vandopsis*. He pointed out Schlechter's oversight of Reichenbach's earlier reinstatement of *Arachnis*, and went on to differentiate between the two genera. According to Smith, the decisive distinguishing character was the attachment of the lip. In *Arachnis* the lip is mobile, while in *Vandopsis*, the attachment is fast. Smith also felt that it was unnecessary to reinstate the two genera, *Armodorum* and *Esmeralda*. His list of *Arachnis* species therefore included the following:

*Arachnis flos-aeris* (L.) Rchb.f.  
*Arachnis maingayi* (Hook.f.) Schltr.  
*Arachnis annamensis* (Rolfe) J. J. Sm.  
*Arachnis alba* (Ridl.) Schltr.  
*Arachnis hookeriana* (Rchb.f.) Rchb.f.  
*Arachnis lowii* (Lindl.) Rchb.f.  
*Arachnis lowii* var. *rohaniana* J. J. Sm.  
*Arachnis beccarii* Rchb.f.  
*Arachnis celebica* (Rolfe) J. J. Sm.  
*Arachnis sulingi* (Bl.) Rchb.f.  
*Arachnis labrosa* (Lindl.) Rchb.f.  
*Arachnis cathcartii* (Lindl.) J. J. Sm.  
*Arachnis clarkei* (Rchb.f.) J. J. Sm.  
*Arachnis bella* (Rchb.f.) J. J. Sm.

This list indicated that Smith had firmed up in his own mind the differences between *Arachnis* and *Vandopsis*. In 1909, he had transferred Reichenbach's *Arachnis beccarii* to the genus *Vandopsis*, but in the above list, he once again included that species in *Arachnis*. He followed Ridley in reducing *A. rohaniana* Rchb.f. to a variety of *A. lowii* (Lindl.) Rchb.f.

In 1914, Schlechter described the orchids of Dutch New Guinea. Under the genus *Vandopsis* Pfitzer, he discussed Smith's response to his previous article regarding *Vandopsis* and its allied genera. According to Schlechter, Smith had attached too much importance to the single character of the attachment of the lip to the column. Schlechter pointed to another character which could be used to separate the two genera, namely that the column of *Arachnis* was usually longer than that of *Vandopsis*. He also reiterated his stand that *Esmeralda* Rchb.f. and *Armodorum* V. Breda warranted generic distinction from *Arachnis* Blume. One new species, *Vandopsis longicaulis*, was described by him in the article. Accompanying the description was a note to the effect that the species answered to Smith's concept of the genus *Arachnis*. However, Schlechter stressed its similarity to *Vandopsis gigantea* (Ldl.) Pfitzer, and placed it next to *Vandopsis celebica* (Rolfe) Schltr. and *V. breviscapa* (J. J. Sm.) Schltr.

Apparently, Smith felt behooved to make reply, for in 1914, he transferred *Vandopsis muelleri* (Krzl.) Schltr. to the genus *Arachnis*. Agreeing with Schlechter that the column of *Arachnis* was generally longer than that of *Vandopsis*, Smith took the opportunity to point out that on the basis of this character, Schlechter's *Vandopsis lowii*, *V. breviscapa* and *V. muelleri* would

have to belong to the genus *Arachnis*. Regarding the genus *Armadorum*, Smith maintained that the type species *Armadorum distichum* V. Breda was a typical *Arachnis* species. Smith also mentioned that from the description, Schlechter's *Vandopsis longicaulis* belonged in the genus *Arachnis*. At the time, however, he left it in the genus *Vandopsis* because he had not even seen a drawing of the species.

Schlechter persisted in his views despite Smith's publications. These views were perpetuated in his major publication, "Die Orchideen" (1914-15; 2nd ed. 1927). As a result of the wide acceptance of this comprehensive statement on orchid classification, Schlechter is usually quoted as the authority on the subject of *Arachnis* and *Vandopsis*. Moreover, Smith's comments on the subject were published in scattered papers which were extremely difficult of access to later workers. In "Die Orchideen," Schlechter again maintained *Esmeralda* Rchb.f. as a distinct genus from *Arachnis* Bl. The two species listed were *Esmeralda cathcartii* (Lindl.) Rchb.f. and *E. clarkei* Rchb.f. His list of *Vandopsis* species included *Vandopsis lowii* (Lindl.) Schltr., while under *Arachnis*, *A. annamensis* (Rolfe) J. J. Sm. and *A. flos-aeris* (L.) Rchb.f. were listed. Conserving the genus *Armadorum* V. Breda, Schlechter listed three species, *Armadorum sulingi*, *A. labrosum*, and *A. siamense*.

Oakes Ames (1915) stated that *Arachnis* Bl. contained fifteen species in his work on the genera and species of Philippines Orchids. He described a new species in the genus from the Philippines, naming it *Arachnis lyonii* after its collector. Under the genus *Esmeralda*, Ames listed one species, *E. sanderiana*, which had been described by Reichenbach in 1882. Ames felt that *Esmeralda* was a small group which was best kept as a section of *Vanda*. This opinion was probably based on his familiarity with *E. sanderiana*, a species which Reichenbach later removed from *Esmeralda* and placed in the genus *Vanda*, and which Schlechter subsequently renamed *Euanthe sanderiana*, creating a monotypic genus.

A new species of *Arachnis* was described and figured by J. J. Smith in 1920. He named it *A. vanmullemii* because the species was described from a specimen growing in the garden of D. van Mullem in Java. The habitat of the plant was unknown, and Smith suggested the possibility that the plant might be of hybrid origin.

As late as 1922, the wrong name, *Arachnanthe*, was still used instead of *Arachnis* in a long article about the genus in the *Orchid Review*. In this article, the genus *Arrhynchium* was recognized while the genus *Esmeralda* was not. Guillaumin (1932) also used *Arachnanthe* Bl., placing *Arachnis* Bl. in synonymy in his treatment of the Orchidaceae in the "Flore Generale de L'indo-Chine" of Lecomte and Humbert. He listed a single species *A. annamensis* Rolfe. In J. J. Smith's "Enumeration of the Orchidaceae of Sumatra and Neighbouring Islands" (1963), *Arachnis alba* was listed in synonymy to *Arachnis hookeriana*.

R. E. Holttum was a pteridologist who became interested in orchids when he went to Malaysia to work. Eventually, he became the authority on Malayan orchids. One of the genera he published extensively on was *Arachnis*. In 1933, he gave a general description of *Arachnis breviscapa* (J. J. Sm.) J. J. Sm., noting that Schlechter had placed it in *Vandopsis* along with *Vanda lowii* and *Vanda batemannii* (*V. lissochiloides*). Holttum favored maintaining the name *Arachnis breviscapa* at the time because the



distinctions of that group of genera were not at all clear. Two years later, he wrote an article on "The Scorpion Orchids with Descriptions of Varieties now in Cultivation" (1935). The article contained a synopsis of the nomenclatural problems in *Arachnis* and the following species and varieties were described:

*Arachnis flos-aeris*, the Common Scorpion Orchid

var. *gracilis*

var. *insignis*

*Arachnis maingayi*, Dr. Maingay's Scorpion Orchid

var. *maculata*

var. *tricolor*

*Arachnis hookeriana*, the White Scorpion Orchid

var. *luteola*

var. *viridipes*

These varietal names, however, were not validly published because there were no accompanying Latin diagnoses as required by article 36 of the International Code of Botanical Nomenclature. Nonetheless, they were useful for horticultural purposes. *Arachnis* species produced handsome flowers, and since they adapted well to local cultures, they became important in the breeding programs of orchidists in Malaysia. Holttum reported that *Arachnis* species appeared to cross freely with *Renanthera*, *Vanda*, *Phalaenopsis* and possibly other allied genera.

The following year (1936), in the Malayan Orchid Review, Holttum reported the first flowering of the hybrid *Arachnis hookeriana* x *A. flos-aeris*. The habit of the plant and the flowers produced were indistinguishable from *A. maingayi*, leading Holttum to state conclusively that *A. maingayi* was a natural hybrid between *A. flos-aeris* and *A. hookeriana* (*A. alba*). He further hypothesized that the occurrence of varieties was the result of generations of seeds produced by repeated selfing and perhaps back-crossing with one or the other of the parent species.

L. O. Williams (1937) reassigned Schlechter's *Vandopsis longicaulis* to the genus *Arachnis* without giving any reasons for this change. He made the new combination, *Arachnis longicaulis* (Schltr.) L. O. Williams, and listed *Arachnis lyonii* Ames in synonymy, stating that the details of the flower of the two species seemed identical. Later in the same year, Williams transferred *Stauroopsis imthurnii* Rolfe to the genus *Arachnis*, forming the new combination *Arachnis imthurnii* (Rolfe) L. O. Williams. *Stauroopsis imthurnii* had been described by Rolfe and illustrated in the Botanical Magazine in 1917. The plant had been brought from the Solomon islands by Sir Everard im Thurn, and was named in his honor. However, the genus *Stauroopsis* was proposed by Reichenbach in 1860 for two species originally named in *Trichoglottis* by Lindley. One of these, *T. pallens*, is a *Phalaenopsis* while the other is retained under the older generic name as *Trichoglottis philippinensis* Ldl. The generic name, *Stauroopsis*, is therefore a segregate. In support of his transfer, Williams wrote:

A study of this species indicates that it should be referred to the genus *Arachnis*. The lateral lobes of the lip are entirely free from the column and the attachment at the base in specimens which I have seen (probably from the type plant), is not so great as that shown in the above cited plate. (Bot. Mag. t 8714, 1917).

In 1939, Holttum wrote an article entitled "Some Hybrid Orchids, Natural and Artificial," in which he expanded his thesis of the hybrid nature of *Arachnis maingayi*. He continued his study of *Arachnis* hybrids and varieties, and in 1941, wrote another article on the subject in the Malayan Orchid Review. Included in this article was a note on *Arachnis flos-aeris* var. *gracilis* which he described in 1935. Holttum felt that the only alternative to regarding this plant as a variety was to make it a new species. A study of the specimens in the Singapore Herbarium revealed that the collections of *A. flos-aeris* from the west coast of Malaya was of this variety. Holttum concluded from this that *A. flos-aeris* var. *gracilis* was probably the parent of *A. maingayi*, and not the typical form of *A. flos-aeris*.

Attempting to straighten out the taxonomic tangle involving the genera *Renanthera*, *Arachnis* and *Vandopsis*, Holttum (1947) did a comparative survey of these three and allied genera of orchids. In essence, his position regarding the delimitation of these genera was that of J. J. Smith. Holttum found Schlechter's descriptions of genera to be often vague and unsatisfactory. Smith's work, on the other hand, appeared to him to be always precise and accurate. Emphasizing the lip and its relation to the column as the major distinguishing characters, Holttum gave brief, comparative descriptions of lip structure in the type species of the three genera, *Renanthera coccinea* Lour., *Vandopsis lissochiloides* (Gaud.) Pfitz. and *Arachnis flos-aeris* (L.) Rchb.f. He divided *Arachnis* into the five following groups, noting that each of these groups might warrant generic ranking.

1. The typical *Arachnis*
  - a. *A. annamensis* (Rolfe) J. J. Sm.
  - b. *A. flos-aeris* (L.) Rchb.f.
  - c. *A. hookeriana* (Rchb.f.) Rchb.f.
  - d. *A. maingayi* (Hook.f.) Schltr.
  - e. *A. vanmullemii* J. J. Sm.
2. Group of *A. breviscapa*
  - a. *A. breviscapa*
  - b. *A. celebica* (Schltr.) J. J. Sm.
3. Group of *A. sulingi*
  - a. *A. cathcartii* (Ldl.) J. J. Sm.
  - b. *A. clarkei* (Rchb.f.) J. J. Sm.
  - c. *A. labrosa* (Ldl.) Rchb.f.
  - d. *A. sulingi* (Bl.) Rchb.f.
4. Group of *A. lowii*
  - a. *A. lowii* (Ldl.) Rchb.f.
  - b. *A. rohaniana* Rchb.f.
5. *Arachnis muelleri* (Krzl.) J. J. Sm.

Of his third group, the group of *A. sulingi*, Holttum had only seen specimens of *A. sulingi*. This explains why he included *A. cathcartii* and *A. clarkei* in the same group as *A. sulingi* and *A. labrosa*. *Esmeralda cathcartii* and *E. clarkei* are obviously closely related to each other, but quite distinct from *A. sulingi* and *A. labrosa*. As for his group of *A. lowii*, Pfitzer had earlier provided the sectional name *Erianthe*, while Rolfe had proposed the new generic name *Dimorphorchis*. *Arachnis rohaniana* Rchb.f., which had been ranked as a variety of *A. lowii* by J. J. Smith, was considered distinct enough to warrant species status by Holttum.

Holttum's attempt to clarify the systematic situation of the genera *Arachnis*, *Renanthera* and *Vandopsis* apparently was not completely successful. It elicited response from E. W. Cooper (1948), who raised some questions regarding Holttum's delimitation of the genera as well as his choice of characters. Cooper's article, however, showed a lack of familiarity with the rules of botanical nomenclature as well as a lack of appreciation for the problems facing a taxonomist. He presented a grower's viewpoint that a genus should be easily recognizable and should, therefore, be characterized by the general aspect of the flower. On this basis, he suggested a separation of *Arachnis breviscapa* and *A. celebica* from the genus *Arachnis* as represented by *A. flos-aeris*. Similarly, he felt that *Arachnis cathcartii* and *A. clarkei* in the *A. sulingi* group should be distinguished from the other species in the group. He used Reichenbach's generic name of *Esmeralda*, but felt that *Arachnanthe* was quite applicable for the two species. *Arachnis labrosa* and *A. sulingi*, according to Cooper, should be distinguished on the basis of their spurs. By the same token, *Arachnis lowii* and *A. rohaniana* were distinct by reason of their long, pendant flower spikes, and Cooper preferred Rolfe's name of *Dimorphorchis*.

In his response to Cooper's article, Holttum restated his views, stressing the need for dissection and careful scrutiny of specimens. He pointed out some of the difficulties in trying to use the general aspect of the flower for taxonomic purposes, and suggested that growers often did not appreciate the difficulties of the botanist who wished to stabilize nomenclature. While the genus was primarily a category of convenience, he pointed out that an important matter of convenience was uniformity and stability of nomenclature.

In 1949, Holttum described a new species of *Arachnis* from Borneo. He named it *A. calcarata* for its spur. The reported color of deep orange was a strikingly unusual feature for the genus. This apparently endemic species has never been brought into cultivation.

The article "Contributions to the Knowledge of Eastern Asiatic Orchidaceae II" in *Acta Phytotaxonomica* (Tang and Wang, 1951) contained three new species of *Arachnis* created by transference from other genera. *Arachnis evrardii* (Guillaum.) Tang et Wang, comb. nov., was based on *Renanthera evrardii* which Guillaumin had described in 1930. Tang and Wang included the following statement with the transference:

This species is closely related to *A. flos-aeris* (Sw.) Rchb.f., from which it differs in the narrowly lorate leaves and the detailed floral structure.

*Arachnis cannaeformis* (Guillaum.) Tang et Wang was created by transferring the species from *Stauroopsis*. Tang and Wang included this note with the new combination:

It seems nearer to *A. evrardii*, but differs from the latter in the much shorter leaves, the much smaller raceme being 9-20 cm long, the emaculate sepals and petals and the non-lobed and not appendaged epichilum.

The third species, *Arachnis siamense* (Schltr.) Tang et Wang, was a new combination from Schlechter's *Armodyrum siamensis*. Schlechter had described this species in 1912 and had allied it to *Armodyrum labrosum* (Ldl. et Paxt.) Schltr. Tang and Wang distinguished it from *Arachnis labrosa* (Ldl.) Rchb.f. by the lip structure. Unfortunately, in all three cases, little or no

reasons had been provided by Tang and Wang to support their recombinations, and the new names appear to have escaped the notice of later workers.

The three genera *Vandopsis*, *Renanthera* and *Arachnis* were reviewed again, this time by A. D. Hawkes in 1952. He followed the system proposed by Holttum, listing fourteen species in five groups. In 1954, he proposed the following sectional names for the five groups:

1. *Muelleranthe* A. D. Hawkes:  
*Arachnis muelleri* (Krzl.) J. J. Sm.
2. *Erianthe* Pfitz:  
*Arachnis lowii* (Ldl.) Rchb.f.  
*A. rohaniana* (Rchb.f.) Rchb.f.
3. *Holttumanthe* A. D. Hawkes:  
*Arachnis breviscapa* J. J. Sm.  
*A. celebica* (Schltr.) J. J. Sm.
4. *Helleranthe* A. D. Hawkes:  
*Arachnis cathcartii* (Ldl.) J. J. Sm.  
*A. clarkei* (Rchb.f.) J. J. Sm.  
*A. labrosa* (Ldl.) Rchb.f.  
*A. sulingi* (Bl.) Rchb.f.
5. *Euarachnis* A. D. Hawkes:  
*Arachnis annamensis* (Rolfe) J. J. Sm.  
*A. flos-aeris* (L.) Rchb.f.  
*A. hookeriana* (Rchb.f.) Rchb.f.  
*A. maingayi* (Hook.f.) Schltr.  
*A. vanmulleemii* J. J. Sm.

These sectional names proposed by Hawkes were not accompanied by Latin descriptions. Therefore, according to article 36 of the code of nomenclature, the names are not valid.

In his address to the Second World Orchid Conference in 1957, Holttum touched upon the disagreement between Schlechter and Smith as to the natural division between *Arachnis* and *Vandopsis*. He repeated his contention that Smith's delimitations were correct, and provided lists of the species in the two genera. In *Arachnis*, he listed seventeen species in six groups. No names were proposed for these groups, but five of them were similar to the sectional divisions employed by Hawkes. The sixth group contained the single species *Arachnis calcarata* Holtt. In addition to the species he had listed in the other five groups in 1947, the same list that Hawkes followed, Holttum added *A. longicaulis* (Schltr.) L. O. Williams to the group of *A. breviscapa*, while the species *A. beccarii* Rchb.f. was placed with *A. muelleri* (Krzl.) J. J. Sm. No mention was made of the new species created by Tang and Wang, or of L. O. Williams's transfer of Rolfe's species to *A. imthurnii*.

P. F. Hunt (1970) made a new combination, *Vandopsis imthurnii* (Rolfe) P. F. Hunt, reducing *Stauroopsis imthurnii* Rolfe to synonymy. No reasons were provided for the transfer, and apparently, like Holttum, Hunt was unaware of the earlier recombination, *Arachnis imthurnii* (Rolfe) L. O. Williams. Finally, in 1971, the name *Esmeralda clarkei* Rchb.f. was again brought into use by G. A. C. Herklotts, who wrote an article on the species and illustrated it in the Orchid Review.

The permutations and synonymies of the various species of *Arachnis* are summarized in Table I. Authors and years of publication are included.

PERMUTATIONS AND SYNONYMIES OF ARACHNIS SPECIES  
TABLE I:

ARACHNIS	ARACH-NANTHE	RENANTHERA	VANDOPSIS	OTHER
A. ALBA (Ridl.) Schltr. 1911	A. ALBA Ridl. 1893	R. ALBA (Ridl.) Ridl. 1896		
A. ANNAMENSIS (Rolfe) J. J. Sm. 1912	A. ANNAMENSIS Rolfe 1905			
A. BECCARII Rchb.f. 1886			V. BECCARII (Rchb.f.) J. J. Sm. 1909	
A. BELLA (Rchb.f.) J. J. Sm. 1912				ESMERALDA BELLA Rchb.f. 1888
A. BREVISCAPA (J. J. Sm.) J. J. Sm. 1912	A. BREVISCAPA J. J. Sm. 1909		V. BREVISCAPA (J. J. Sm.) Schltr. 1911	
A. CALCARATA Holtt. 1949				
A. CANNAE- FORMIS (Guillaum.) Tang et Wang 1951				STAUROPSIS CANNAE- FORMIS Guillaum. 1930
A. CATHCARTII (Ldl.) J. J. Sm. 1912	A. CATHCARTII (Ldl.) Benth. et Hk. f. 1883			VANDA CATHCARTII Ldl. 1853 ESMERALDA CATHCARTII (Ldl.) Rchb.f. 1874
A. CELEBICA (Rolfe) J. J. Sm. 1912			V. CELEBICA (Rolfe) Schltr. 1911	VANDA CELEBICA Rolfe 1899
A. CLARKEI (Rchb.f.) J. J. Sm. 1912	A. CLARKEI (Rchb.f.) Rolfe 1888			ESMERALDA CLARKEI Rchb.f. 1886 VANDA CLARKEI (Rchb.f.) N.E.Br. 1888

TABLE I: *Continued*

ARACHNIS	ARACH- NANTHE	RENANTHERA	VANDOPSIS	OTHER
A. EVRARDII (Guillaum.) Tang et Wang 1951		R. EVRARDII Guillaum. 1930		
A. FLOS-AERIS (L.) Rchb.f. 1886 A. FLOS-AERIS (L.) Schltr. 1911	A. FLOS-AERIS (L.) J. J. Sm. 1905	R. ARACHNITES Ldl. 1833 R. FLOS-AERIS (L.) Rchb.f. 1855		LIMODORUM FLOS-AERIS (L.) Sw. 1799 EPIDENDRUM FLOS-AERIS L. 1753 AERIDES FLOS-AERIS (L.) Sw. 1799
A. HOOKERIANA (Rchb.f.) Rchb.f. 1886 A. HOOKERIANA (Rchb.f.) Schltr. 1911	A. HOOKERIANA (Rchb.f.) Ridl. 1893	R. HOOKERIANA Rchb.f. 1874		
A. IMTHURNII (Rolfe) L. O. Wms. 1937			V. IMTHURNII (Rolfe) Hunt 1970	STAUROPSIS IMTHURNII Rolfe 1917
A. LABROSA (Ldl. et Paxt.) Rchb.f. 1886	A. BILINGUIS (Rchb.f.) Benth. 1881	R. LABROSA (Ldl. et Paxt.) Rchb.f. 1855 R. BILINGUIS Rchb.f. 1855		ARRHYN- CHIUM LABROSUM Ldl. et Paxt. 1850 ARMODORUM LABROSUM (Ldl. et Paxt.) Schltr. 1911
A. LONGICAULIS (Schltr.) L. O. Wms. 1937			V. LONGICAULIS Schltr. 1914	
A. LOWII (Ldl.) Rchb.f. 1886	A. LOWII (Ldl.) Benth. et Hk.f. 1883	R. LOWII (Ldl.) Rchb.f. 1855	V. LOWII (Ldl.) Schltr. 1911	VANDA LOWII Ldl. 1847 DIMORP- HORCHIS LOWII (Ldl.) Rolfe 1919

TABLE I: *Continued*

ARACHNIS	ARACH- NANTHE	RENANTHERA	VANDOPSIS	OTHER
A. LYONII Ames 1915				
A. MAINGAYI (Hk.f.) Schltr. 1911	A. MAINGAYI Hk.f. 1889			
A. MOSCHIFERA Bl. 1825		R. MOSCHIFERA (Bl.) Hassk. 1848		
A. MUELLERI (Krzl.) J. J. Sm. 1914			V. MUELLERI (Krzl.) Schltr. 1911	VANDA MUELLERI Krzl. 1894
A. ROHANIANA (Rchb.f.) Rchb.f. 1886 A. LOWII (Ldl.) Rchb.f. Var. ROHANIANA (Rchb.f.) J. J. Sm. 1912		R. ROHANIANA Rchb.f. 1855 R. LOWII (Ldl.) Rchb.f. Rchb.f. var. ROHANIANA (Rchb.f.) Ridl. 1896		
A. SIAMENSIS (Schltr.) Tang et Wang 1951				ARMODORUM SIAMENSE Schltr. 1912
A. SULINGI (Bl.) Rchb.f. 1886	A. SULINGI (Bl.) Benth. 1883 A. SULINGI (Bl.) J. J. Sm. 1905	R. SULINGI (Bl.) Ldl. 1940		AERIDES SULINGI Bl. 1825 ARMODORUM DISTICHUM V. Breda 1827 VANDA SULINGI (Bl.) Bl. 1849 ARMODORUM SULINGI (Bl.) Schltr. 1911
A. VAN- MULLEMII J. J. Sm. 1920				

## NEOMORTONIA, A NEW GENUS IN THE GESNERIACEAE

Hans Wiehler\*

On one of my visits to the National Herbarium in Washington, D.C., in 1969, Mr. Conrad V. Morton, curator of ferns, Gesneriaceae, Solanaceae, etc. showed me three gesneriad collections from Colombia which he had on loan from Stockholm since 1937. He told me that this material might possibly represent a new genus, asked where such a taxon would be placed in my then developing scheme of realignment of the genera of the neotropical subfamily Gesnerioideae, and suggested to try my luck with this odd species.

Since that time I have found many other herbarium collections of this species, some more information about it on the sheet labels, but no other close relative of it in the tribe Episcieae Endlicher. But Gesneriaceae are one of those tropical plant families best studied through the observation of living material. On one of my field trips in search of Gesneriaceae I was fortunate to find this species in flower and fruit in Colombia, and to bring it back to cultivation to the greenhouses of the University of Miami for further research (plant accession number W-1699). I also obtained in 1971 seed of a Panamanian collection from Dr. Helen Kennedy who knew of my interest in this elusive species we had tried to find on an earlier field trip, but this material has not yet flowered although it grows vegetatively very vigorously (accession number W-1606).

From the study of 23 different herbarium collections from Colombia, Panama, and Costa Rica, from the observation of living material in the field, greenhouse, and laboratory, and from the insights gained from my work on a new classification of the neotropical Gesneriaceae, it appears now clear that this species represents a new genus in the tribe Episcieae. A new evaluation of the taxonomic characters useful in the classification of the subfamily emphasizes the importance of the fruit character for generic delimitations. Until recently, detailed information on the fruit was not available for many taxa of the Gesnerioideae. The fruit of the new species is an ovoid, laterally somewhat flattened, bright orange berry. Most of the 19 genera of the tribe Episcieae have a capsular fruit, but seven genera are characterized by having a baccate fruit: *Columnnea* Linnaeus, *Dalbergaria* Tussac, *Trichantha* Hook., *Pentadenia* (Planch.) Hanst., *Codonanthe* (Mart.) Hanst., *Corytoplectus* Oerst., and another new genus with three undescribed species. The new species does not fit into any one of these genera since it differs strongly from these taxa in floral construction and in the shape and color of the berry. (Round orange berries occur in a few species of *Codonanthe* from southeastern Brazil, but this genus differs in base chromosome number from the rest of the baccate taxa of the tribe.) The new species shows some kinship to the two species of the section *Alsobia* (Hanst.) Benth. of *Episcia* Mart., *E. punctata* (Lindl.) Hanst., and *E. dianthiflora* Moore & Wilson, both from Central America; but these species possess the stoloniferous habit typical of *Episcia* and they have a capsular fruit. All attempts to hybridize the new species with other taxa of the tribe Episcieae have failed so far. These still inconclusive results stand in contrast to the fact

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